Amidophosphoric acid crystallises in tabular or short prismatic crystals which are insoluble in alcohol, but readily soluble in water, to which they impart a sweetish taste. The solution is readily distinguished from phosphoric acid inasmuch as it yields no precipitate with silver nitrate. It evolves no ammonia upon treatment with caustic alkalies, but merely forms the salt of the alkali metal. The solution slowly decomposes into ammonium phosphate. The solutions of the acid and neutral salts of the alkaline metals yield many corresponding acid and neutral amidophosphates of other metals by double decomposition with soluble salts of those metals.

Notes from the Marine Biological Station, Plymouth :—Last week's captures include *Phoronis hippocrepia*, the Actinian *Corynactis viridis*, and the Foraminiferan *Haliphysema*. In the floating fauna the Cœlenterate element remains unchanged ; the larvæ of the Nemertine *Cephalothrix* have made their first appearance for the year ; the number of Polychæte larvæ and of Cirrhipede *Nauplii* has become considerably smaller ; the later stages of various Decapod Crustacea (*Megalopa*, *Mysis*-stages) have appreciably increased in numbers ; and minute young *Oikopleuræ* now occur in considerable quantity. The "gelatinous alga" and *Rhizoselenia* are extremely abundant. The Hydroid *Tubularia bellis*, the Gastropod *Nassa reticulata*, and the Decapod Crustacea *Pagurus lævis*, *Galathea squamifera*, *Porcellana platycheles* and *Pilumnus hirtellus* are now breeding.

The additions to the Zoological Society's Gardens during the past week include an Orang-Outang (*Simia satyrus*, ♂) from Borneo, presented by Mr. Thomas Workman ; a Spotted Ichneumon (*Herpestes nepalensis*) from India, presented by Lady Blake ; a Raven (*Corvus corax*) British, presented by Lady Rose ; a Peregrine Falcon (*Falco peregrinus*) British, presented by the Old Hawking Club ; a Greek Tortoise (*Testudo græca*) European, presented by Mrs. Alcock ; a Martineta Tinamou (*Calodromas elegans*) from Argentina, three Spotted-sided Finches (*Amadina lathami*) from Australia, purchased ; a Panama Amazon (*Chrysotis panamensis*) from Panama, received in exchange ; six Indian Wild Swine (*Sus cristatus*), four Barbary Mice (*Mus barbarus*) born in the Gardens.

## *OUR ASTRONOMICAL COLUMN.*

Large Telescopes.—Much has been written during the last few months with reference to the usefulness or non-usefulness of large telescopes. That the verdict is given in favour of the former is not at all surprising, for are we not far away from the limit, if there be one, beyond which larger instruments will be available? Dr. Common has many times pointed out the practicability of constructing large reflectors (his five-foot being a good example of the type of instrument he could enlarge), while the Lick instrument, the work of the Clarks, is really only a beginning of what will be done in large telescope building. For refractors it has many times been urged that the increase in size of lenses involves such a thickness that much light is thereby lost by absorption. M. Alvan G. Clark, with reference to this particular point, says a few words in *Astronomy and Astrophysics* for April, in which he points out that such is not the case. Greater aperture means greater light-grasping power, and as it is quite unnecessary to considerably increase the thickness of the lens, the former predominates over the latter. With the forty-inch discs, he says, only a combined thickness of four inches is required, and with lenses of an object-glass of even six feet aperture a combined thickness of only six inches would be necessary. It is pleasing to hear through him that a steady improvement is being made in manufacture of glass, and that the present discs are *infinitely* superior to the early ones, and "who knows," as Mr. Clark says, "how soon still more transparent glass may be at hand."

Spectrum of β Lyræ.—The extreme interest that lies in this variable, especially for spectroscopists, makes it a subject of keen research, and the important observations made by Prof. Keeler with the great Lick refractor, and contributed to the number of *Astronomy and Astrophysics* for April, will be the more eagerly read. The observations were undertaken with the intention of connecting possible changes in the spectrum of the star with its period of light variability. After plotting a number of observations on the light curve of the star, the recorded appearances of the spectrum "were in some degree contradictory," although certain results were obtained, but they were left incomplete, owing to Prof. Keeler's withdrawal from the observatory. The results may be briefly stated as follows :—

(1) Bright hydrogen lines C and F, bright $D_3$ line and dark D lines are always visible with the Lick refractor. Certain fainter bright lines are absent only at principal minimum.

(2) Light variations due to changes in brightness of continuous spectrum.

(3) Bright lines brightest when continuous spectrum brightest.

(4) Bright lines broad and diffuse, particularly when star at maximum. D lines very hazy, so that components are hardly distinguishable.

(5) No really remarkable changes in the appearance of the spectrum took place during greater part of period. Observations show no relation between spectral changes and secondary minimum of the star.

(6) Most remarkable changes at principal minimum. "The bright lines became dimmer and perhaps sharper. The fainter bright lines disappear. The D lines become darker. Strong absorption lines appear on the more refrangible side of certain bright lines in the green, the separation of the dark and bright lines being at least five-tenth-metres. Other bright lines are perhaps similarly affected. A narrow dark line appears above the $D_3$ line at the same time. Shortly before the first maximum is reached the dark lines disappear."

Prof. Keeler adds that the method of observation he adopted was only capable of allowing him to observe a "part of a much more complex series of changes" which no doubt takes place.

Société Astronomique de France.—In the *Bulletin* of this society for 1892, the sixth year since its foundation, several articles of importance will be found to be scattered throughout its numerous pages. Of these we may refer our readers to some selenographic studies by MM. Gaudiberi, Flammarion, and Antoniadi, examination of recent studies of Jupiter by M. Flammarion, and M. Edouard Foulséré's graphical method of determining the co-ordinates of solar spots. The valuable observations made by M. E.-L. Trouvelot on the planets Venus and Mercury, a full account of which has been given in these columns (Nature, vol. xlvi. p. 468), will also be found here, together with a discourse by M. F. Tisserand on the movement of the moon, with reference to ancient eclipses. Among other communications M. Schmoll gives a summary, with tables, of the solar spots observed during the year 1891, M. Guillaume describes his observations on the surface and rings of Saturn, and MM. Quenisset and Trouvelot contribute their observations on planets and remarkable solar protuberances respectively. A simple method of determining the positions of solar spots, and of measuring their displacements, is treated by Dr. Huette, while M. Bruguière gives a most interesting account of M. Lippmann's work on photography in colours, and M. Pluvinel on the coming (now past) eclipse of the sun.

Wolsingham Circular, No. 34.—With reference to the contents of the Wolsingham Circular, which we recently gave, Dr. Kreutz, in *Astronomische Nachrichten*, says :—"The first star, Esp.-Birm 180, is certainly given by Chandler as (2258). Aurigæ in his list of probable variable stars A. J. 216 ; see also *Astronomische Nachrichten*, 2764, p. 63, No. 2. The second star is evidently identical with B.D. $+ 57^{\circ}\cdot727$ = A. G. Hels. 3032. Position for 1900 : 3h. 23m. 23s., $+ 58^{\circ}\ 9'\cdot0$. The original magnitudes of the Hels. zones are : 9·1m (February 15, 1872), and 9·0m. (February 15, 1873).

Astronomical Journal Prizes.—The judges appointed by the editor of the *Astronomical Journal* say a few words in the current number (No. 293) with reference to some general considerations connected with the presenting or withholding of the awards. For comet observations, allowance for optical qualities of telescopes will to a certain extent be made ; relative freedom from systematic peculiarities of observation will be regarded "as a mark of excellence. Even more important than the nominal or apparent precision in other respects." For individual precision of observations, freedom from large or abnormal errors

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would be of the first importance. In orbit computation the judges will regard with special attention care exercised in revision of published observation, ingenuity displayed in searching out and evaluating systematic errors, completeness and soundness of discussion, ability shown in indicating probable limits of uncertainty in adopted elements, &c. With regard to variable stars, enough has already been said, but the judges remark that definite reductions cannot of course be expected, as from the nature of the case many years must elapse.

## *GEOGRAPHICAL NOTES.*

THE Hon. G. N. Curzon, M.P., read a paper on his recent journey in Indo-China at the meeting of the Royal Geographical Society on Monday. The whole region, he pointed out, is dominated by its great rivers, and may be divided into the mountain district of the north cleft by vast gorges, and the low plains of the south mainly composed of alluvial deposits, where the coast lands are steadily encroaching on the sea. In the seventh century Tongking, now 60 miles inland, was on the coast. A very remarkable feature which gives to parts of the coast a beauty comparable with that of the Inland Sea of Japan is a broken belt of limestone cut into curious flat-topped sections of all sizes, and perforated by the sea or rivers with many fantastic caverns and tunnels. The masses of caverned rock rise to a height of from 50 to 500 feet, and are best seen in the Bay of Along in Tongking. In Annam Mr. Curzon travelled to Hué by the "Mandarin's Road," a track which is carried over several cols by some skilful engineering in the form of rock staircases. Throughout Annam the traveller is much confused by the number of names applied indiscriminately to each village, and the maps hitherto constructed by the French officials are far from satisfactory. The people of Annam have the submissiveness without the nerveless apathy of the Hindu, and as craftsmen they are industrious and artistic. Coal is abundant, some seams being more than 180 feet thick at Haton, on the Bay of Along. Hué is a city of great interest, being beautifully situated and near a number of magnificent ancient tombs. Cambodia or Cambogia, as Mr. Curzon prefers to spell the name, is of interest, mainly on account of its ruins, the number and character of which make a long stay desirable, if the traveller would do justice to his opportunities.

THE newly published report of the Bengal census reveals the interesting fact that there is a steady transference of population from the most densely to the more thinly peopled parts of the province, the former prejudice against leaving the native village having apparently vanished. Mohammedanism is increasing rapidly in Bengal, and the custom of widow marriage amongst Hindus has become common. These facts are significant of progress.

THE supremacy of the great ports of Europe as entrepôts for the trade of the world is rapidly becoming a thing of the past. Two recent instances of independent action on the part of the colonies are of more than local importance. One is the establishment of a line of steamers trading direct from New York to Cape Town, another the commencement of a regular service of fast steamers from Vancouver to Sydney, N.S.W.

A COMMUNICATION was lately made to the Paris Geographical Society on the strength of a statement in a Russian newspaper, describing a curious mountain group in Podolia. This is said to rise abruptly from the plain with a grandly rugged crest composed of a broken circular rim surrounding a crater-like depression. The whole mass is composed of limestone, in which fossil corals abound, and the inference drawn is that this is, in fact, a full-sized fossil tertiary atoll. The name of the mountain is given as Miodoborski, but it is called Toltra by the natives.

AT a general meeting of the Royal Geographical Society called by the requisition of a few Fellows who objected to the action of the Council in the manner of admitting women to the Fellowship of the Society, it was proposed to frame a bye-law restricting the privileges of lady Fellows, and rendering them incapable of serving on the Council or in any office in the Society. The question whether ladies should be admitted at all was voted upon after a somewhat heated discussion, and it was decided by 147 to 105 that women should not be admitted as Fellows of the Society. This decision was entirely unforeseen; it is a retrograde step which, we feel sure, will be disapproved and regretted by the majority of the Society.

THE Royal Medals of the Royal Geographical Society have been awarded to Mr. F. C. Selous for his travels in Africa, and to Mr. W. W. Rockhill for his journeys in Tibet. The Gill Memorial was awarded to Mr. H. C. Forbes, and the Cuthbert Peek Grant to Mr. Charles Hose for his travels in Sarawak. Major Powell, Washington, Prof. Ratzel, Leipzig, and M. Vivien de St. Martin, Paris, were elected honorary corresponding members of the society.

## *INSTITUTION OF MECHANICAL ENGINEERS.*

ON the evenings of Thursday and Friday last week, April 20 and 21, an ordinary general meeting of the Institution of Mechanical Engineers was held in the theatre of the Institution of Civil Engineers, by permission of the Council of the latter body. There were three papers on the Agenda, but only two were read, namely, Mr. Dean's paper on copper plates for locomotives, and the second report of the Alloys Research Committee, the author of which was Prof. W. C. Roberts-Austen, C.B., F.R.S. Our readers will remember that the first report of the Alloys Research Committee was read, and discussed at the October meeting of 1891, and an abstract of it appeared on page 22 of our 45th volume. A large part of the first report was taken up by the consideration of the effect of various alloys on gold, and it will be remembered that the author was somewhat sharply criticised for the course he had taken in framing his report, gold being a metal not used by engineers, at least for constructive purposes. This second report carries the matter further, and it is possible now to appreciate Prof. Roberts-Austen's reasons for taking the course he did. In opening the subject he referred again to the "periodic law" of Newland and Mendeleeff, and upon it he based a large part of his reasoning in the first report. The researches of Raoult Van't Hoff, and Arrhenius, led to the view that the molecules of small quantities of elements, distributed through a mass of a solvent, retain their individuality. The work of Heycock and Neville (and also the experiments described in the author's previous report) point to the conclusion that the added elements may retain their freedom when they are present in much larger quantities than 0·2 per cent., which is the amount of added matter the Committee usually dealt with in their researches. The point raised was whether the added element does, or does not, remain free in the mass of the solvent, and as the author pointed out, it is a vital one in limiting the scope of the inquiry.

If the added element enters into combination with the solvent its individuality will be changed, and it might be that the mechanical properties of the metallic mass would mainly depend on the degree of fusibility of the compound formed. If the concentration of the solution is such that a fraction of the dissolved body alone remains isolated, the influence of the volume of the added elements, will evidently be disturbed, as this influence is supposed to be exerted only by a single constituent of the mixture, whilst the mechanical properties of a solidified mixture are functions of both constituents, in the favourable circumstances where the solvent is not started by the added element, and where the law of atomic volumes is applicable. A metal is seldom homogeneous and is more often formed of rounded polyhedral grains, and the cohesion in the interior of a grain differs from the adherence between the neighbouring grains. The law of atomic volumes cannot apply, the report pointed out, to the adherence of the grains, that being regulated by other causes, such as the rate of cooling and pressure, and whether a compound be formed, which solders the grains together. Arguing from these facts, the author pointed out that an attempt to prove the nature of the influence of atomic volumes by mechanical tests only led to anomalies, and more or less grave irregularities being encountered. The investigation was not, however, limited to mechanical tests, independently of which it had been shown that the influence of impurity on the molecular transformation in iron, studied by Osmond, may be shown in several ways. Transformation may be assisted by the presence of impurity, the temperature at which they occur may be altered, or the molecular changes may even be entirely prevented by the presence of elements which behave in strict accordance with the law of atomic volumes. The author referred to the remarkable series of experiments recently made by E. Warburg and F. Tegetmeier, which would seem to demonstrate the possibility of producing eventually a degree of porosity in vitreous bodies, which will admit the passage of elements having comparatively small atomic volumes, while other elements, having larger atomic volumes, are strained off, thus occasioning

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